

**MEASURING THE EFFECTIVENESS OF DISASTER PREPAREDNESS TRAINING  
FOR THE CITY OF BELLINGHAM, WASHINGTON**

EXECUTIVE DEVELOPMENT

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## **ABSTRACT**

This research project analyzed the success of recently delivered citywide disaster preparedness training for the City of Bellingham, Washington. The problem was that the City did not know if this training was effective in motivating employees to prepare for disasters. The purpose of this research project was to determine if the mandatory disaster preparedness training resulted in employees actually preparing for disasters. The research questions were: (a) What personal disaster preparedness steps did employees take after the training? (b) What part of the training information did the employees see as the most useful? (c) What disaster preparedness education still needs to be accomplished?

The evaluative research method was used to conduct this research project. The research consisted of a literature review of disaster education publications and adult education publications, interviews with a key local disaster management official and a Bellingham City Council member, and an email survey administered to all city employees.

The principal research instrument was a survey that was distributed to all city employees via the city's intranet email system. The data was compiled electronically as the surveys were completed online and evaluated in context of the findings of the literature review. The survey results fell just below statistical validity.

The survey results showed that 76% of city employees who responded took some form of disaster preparedness step after attending the preparedness training session. The most common step taken was reading the class provided reading materials and discussing this information with family members. The least performed step identified was securing heavy objects from the effects of earthquake movement. Fifty five percent of the employees indicated that personal

disaster preparation steps was the most useful information presented in the training sessions, and explanation of lessons learned from a recent community disaster was seen as least useful in the context of the overall training experience. The survey also indicated that 78.5% of the responding employees would participate in future disaster preparedness training. It also showed that department and division level preparedness and response training and participation in a mock disaster exercise are the topics that interest employees most.

The recommendations from this research include; (a) continuing the initial disaster preparedness education class for all new employees, (b) provide preparedness and response training specific to individual city departments, and (c) develop a plan to deliver a large scale mock disaster exercise to allow employees to exercise their respective department plans and procedures.

**TABLE OF CONTENTS**

ABSTRACT .....2

TABLE OF CONTENTS.....4

INTRODUCTION .....5

BACKGROUND AND SIGNIFICANCE.....5

LITERATURE REVIEW .....9

PROCEDURE.....15

RESULTS .....17

DISCUSSION .....19

RECOMMENDATIONS .....23

REFERENCES .....24

APPENDIX A.....26

APPENDIX B .....27

APPENDIX C .....29

## **INTRODUCTION**

In June 1999, the City of Bellingham, Washington experienced a catastrophic rupture and subsequent explosion and fire involving an underground gasoline pipeline. As a result of this disaster, the City conducted mandatory disaster preparedness training for all city employees in the spring of 2001. The problem is that the City does not know if this training has been effective in motivating employees to prepare for disasters.

The purpose of this research project is to determine if the mandatory disaster preparedness training resulted in employees actually preparing for disasters. The research questions are: (a) What personal disaster preparedness steps did employees take after the training? (b) What part of the training information did the employees see as the most useful? (c) What disaster preparedness education still needs to be accomplished?

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## **BACKGROUND AND SIGNIFICANCE**

Bellingham, Washington is located in Whatcom County in the far northwestern area of Washington State. It is nestled between the Cascade mountain range and the San Juan Islands, on the shores of Bellingham Bay. The 2000 census lists the city's population at 67,171 persons. The Bellingham Fire Department is a career department that staffs five engine companies, one ladder company, and four full time medic units. All advanced life support and basic life support ambulance transports in the city and Whatcom County are performed by these four medic units.

The City's disaster preparation and response plans historically have been given low priority. In 1995, the City began anew to develop a comprehensive disaster plan. This effort stalled in late 1997 with a draft disaster plan that was never formally adopted and introduced. In 1999, Whatcom County Division of Emergency Management (D.E.M.) spearheaded efforts to provide Community Emergency Response Team (C.E.R.T.) courses to county residents. The C.E.R.T. course provides emergency response empowerment and training to residents with the philosophy that these residents are the first line responders to their neighbors in times of community wide crisis. The Bellingham Fire Department partners with D.E.M. to provide instruction and oversight to this very successful training program.

On June 10, 1999 a 16-inch diameter underground pipeline operated by Olympic Pipe Line Company ruptured, spilling approximately 230,000 gallons of unleaded gasoline into Whatcom Creek, a rehabilitated salmon spawning stream which bisects the city. The product flowed downstream for 1.5 miles before being accidentally ignited by two 10-year-old boys who were playing in the area. The resulting explosion and fireball resulted in the destruction of 1.5 miles of prime salmon spawning beds in what is now known as the Whatcom Creek Incident. The intense heat of the fire caused millions of dollars worth of environmental damage and basically sterilized the entire area. Surprisingly, only one structure was lost, a single-family residence. However, the psychological and environmental impact of this disaster is still being felt to this day.

Bellingham Fire Department staff represented the city in the unified incident command structure during the emergency and project phases of the incident. This was the first time that the Department had participated in a full hazardous materials response incident command system. Post incident interagency discussions revealed that all four key incident command

agencies; Olympic Pipe Line Company, Washington State Department of Ecology, and the Environmental Protection Agency were very satisfied with the performance of the unified command organization during the incident. However, internal discussions within the City of Bellingham government showed that the city had significant gaps in its disaster preparedness and response coordination.

Because of the previously abandoned disaster planning effort, during the Whatcom Creek Incident many employees did not know how to react or assist in either the emergency response or the unified incident command system. This motivated the City Council and Mayor to reinstate a recently eliminated Fire Department Assistant Chief position and tasked the Department with revitalizing the city's previously aborted disaster planning effort. The position was filled in September 1999, and disaster planning efforts started in January 2000. A pilot committee of key city department representatives met over the next several months, creating a draft emergency operations plan for the city. Disaster preparedness and Incident Command System training were important components of this planning effort. The Pilot Committee quickly realized that creating a disaster plan was only one component of a successful disaster planning effort. Empowering employees through education and exposure to disaster vulnerabilities was viewed as equal to, if not more important than, creating the plan itself.

With this philosophy in mind, in December 2000 Mayor Mark Asmundson agreed with the Pilot Committee recommendation that all city employees attend mandatory disaster preparedness education. A lesson plan was developed for a 1.5 hour long class, and several of these education sessions were conducted from February through April 2001 to provide the training to as many employees as possible. The training included; (a) information about the county's natural and technological disaster risk, (b) earthquake and hazardous materials

preparedness and action steps, (c) a summary of the lessons learned from the Whatcom Creek Incident, (d) the responsibilities of the City of Bellingham in disaster response, and (e) the planning steps taken after the Whatcom Creek Incident. Interestingly enough, on February 28, 2001 the Puget Sound region experienced a moderate (6.8 on the Richter Scale) earthquake causing billions of dollars of property damage throughout the region (<http://maximus.ce.washington.edu/~nisqually.html>). This earthquake was widely felt throughout Whatcom County.

Six hundred and forty employees attended this mandatory preparedness training. While we received antidotal feedback about the usefulness of these sessions, we have no idea if the presented information actually resulted in behavioral changes and preparedness actions by city employees. Queenly (1995) stresses that the most fundamental value of needs assessment is in determining which programs should be offered and the content of the educational sessions. The World Health Organization (1999) also stresses the importance of validating current and future disaster preparedness training needs by developing instruments to assess, validate and evaluate training needs. It notes that assumptions about community vulnerability sometimes proves false, which leads to inaccurate predictions of community behavior during disaster situations (1999). The City needs to assess the effectiveness of this recent training to identify future training needs.

This applied research project relates to the National Fire Academy Executive Development Course, Unit 10-Service Quality/Marketing. Specifically, this project relates to Section III-Lessons from Award-Winning Government Agencies by addressing one of the key lessons learned from a comprehensive review of state of the art management styles-the need to focus attention as sharply as possible on customer needs (National Fire Academy, 2001).



## **LITERATURE REVIEW**

The purpose of this literature review is to explore the societal and cultural influences of public understanding related to disasters, and take a historical look at how the public responds to disaster mitigation efforts and actual disaster situations. This review should help bring clarity to assessing the City of Bellingham employees survey answers related to the usefulness of the disaster preparedness training. Four questions comprise the foundation of this literature review: (a) What is the commonly accepted definition of disaster? (b) What are some of the key characteristics of disasters related to public mitigation and response? (c) What factors inhibit effective disaster education and preparedness efforts? (d) What are key motivating factors for people to personally prepare for disasters?

### **Defining Disaster**

The first question to address is defining the term *disaster* to help place the motivation of general preparedness efforts into proper context. The term *disaster preparedness* covers a wide spectrum of topics reflective of the widespread types of disasters and the resulting vulnerabilities. H.W. Fisher III (1998) acknowledges Charles Fritz's long standing definition of disaster:

Actual or threatened accidental or uncontrollable events that are concentrated in time and space, in which a society, or a relatively self-sufficient subdivision of society, undergoes severe danger, and incurs such losses to its members and physical appurtenances that social structure is disrupted and the fulfillment of all or some of the essential functions of the society, or its subdivision is prevented (pg. 3).

This definition acknowledges the substantial impairment of the basic service infrastructure of society, resulting in significant widespread citizen impact, and notes the commonly held belief that disasters are social problems. Kreps and Drabek (1996) slightly modified Fritz's definition to further relate the impact of disasters to existing social definitions of disaster by stating disasters are:

nonroutine events in societies or their larger subsystems (e.g. regions, communities) that involve *conjunctions* of historical conditions and social definitions of physical harm and social disruption. Among the key defining properties of such events are length of forewarning, magnitude of impact, scope of impact, and duration of impact (pg. 133).

Furthermore, Krebs and Drabek (1996) note a lack of extensive research of when society recognizes a particular emergency event as a disaster and highlights the importance of defining when society recognizes such a condition. They advocate a historical evaluation of disasters utilizing a functionalist approach that evaluates and explains conditions and behaviors that impede and disrupt achievement of societal goals.

### **Disaster Characteristics**

In addressing the second question, exploring the characteristics of disasters and more importantly the actual and assumed human behaviors of those experiencing the event is also very important. One of the most graphic and recent examples of a near-catastrophic modern urban disaster is the Kobe, Japan earthquake that occurred in January 1995. Tierney and Goltz (1997) note this devastating trembler killed 6279 people, destroyed 136,000 housing units, and over 2.6 million people lost power. He states that in comparison with the Kobe earthquake, the Northridge, California earthquake is considered minor. After the Kobe earthquake neighbors and other citizens performed most of the live rescues. In fact, 65% of these rescues were performed

within 24 hours (World Health Organization, 1999). Spontaneous volunteer groups provided a wide range of goods and services, and approximately 630,000 –1,300,000 volunteers flooded the area to assist (Tierney and Goltz 1997).

Tierney and Goltz (1997) also notes that even though Japan has a long history and culture of confronting disasters (including war), the government was roundly criticized for a perceived slow disaster response, which can be at least partially blamed on the fact that major communication pathways were blocked, and many of the emergency responders and public officials were disaster victims as well. Quarantelli (1996) previously noted that in catastrophic situations, which the Kobe earthquake can arguably be classified, organizational assessment of the situation, accurate information flow, and coordination response efforts are significantly more difficult than in a major disaster situation of lesser magnitude.

### **Inhibiting Factors**

The third question that warrants exploration is identifying the factors that inhibit people from personally preparing for disasters. An overwhelming acknowledgment of public inertia towards preparation efforts seems to resonate in the literature. Erik Auf der Heide (1989) succinctly notes that the general public shows significant apathy towards disaster preparedness. He calls this “the Apathy Factor” and states:

Disasters are “low-probability events”. As such, they compete for attention with the priorities of daily living. Often, getting the public, elected officials, and organizational leaders to support disaster preparedness is just as difficult as developing the disaster countermeasures themselves (pg. 13).

Auf der Heide (1986) goes on to note that the apathy factor has significant influence after a community suffers a disaster, with the public’s interest and motivation rapidly declining as post event time passes. Fischer, III, and McCullough (1993) agree with this observation, coining the

term “decay curve” to define the gradual erosion of interest in preparedness and mitigation efforts post disaster.

There are other obstacles as well. Auf der Heide (1989) notes that the relative infrequency of disasters compared to the amount of expense and effort to prepare is a significant deterrent to adequate preparation efforts. Furthermore, he observes that public apathy reflects in a lack of political support for disaster preparedness, and even if a government establishes preparedness goals, the financial resources allotted often do not match the stated goals. He also notes that these beliefs also pervade governments, as these bodies tend to mirror the beliefs and culture of the constituencies. Larsson and Enander’s (1997) observations agree with this, adding that people have an “unrealistic optimism” of disaster vulnerability which is also compounded by a feeling that if a catastrophic disaster occurred, people feel it is highly unlikely that their preparedness efforts would do any good. Furthermore, their findings note that other major inhibiting factors include uncertainty of not knowing what types of disasters to prepare for and a reluctance to make preparations that require substantial financial and/or time commitment.

Gagnon (1997) evaluated the response of many municipal administrations to disaster preparedness efforts and found that the executive officers of these organizations tended to delegate planning to senior staff, who, reflecting the disinterest of the elected officials, turf it off to staff members. This “trickle down” effect results in development of an emergency plan that is put on a shelf and forgotten.

“Disaster mythology” (Fischer, III, 1998) is another obstacle to effective disaster preparation efforts. This mythology includes many misconceptions of how the public reacts during a disaster event. (Fischer, III 1998) specifically mentions several stereotypical myths that are perpetuated by the mainstream media; (a) people fleeing in a panic, (b) wide spread looting

and price gouging, and (c) widespread use of disaster shelters. He notes that in most disaster situations, people are reluctant to leave their homes unless they recognize the situation as an immediate life threat, which emphasizes the importance of clarity in describing the disaster situation and actions to be taken by the public. This reluctance to evacuate can be partially blamed on unrealistic concerns by disaster victims that their homes and property may be looted (Fischer, III, 1998). Looting and price gouging are not as widespread as portrayed through the media, and that even when shelters are opened to house residents displaced from their homes, very few residents actually use them, instead preferring to stay with friends or relatives (Fischer, III, 1998).

The World Health Organization (1999) also notes the proliferation of incorrect assumptions about community behavior during a disaster, which manifests itself in the rationalizations that; (a) the public already knows what to do, (b) emergencies are unpredictable and impossible to plan for, (c) people do not follow plans in an emergency, and (d) developing plans will worry the public. This organization stresses the importance of developing educational programs designed to counteract these incorrect assumptions.

### **Motivating Factors**

The fourth question relates to identifying the motivational factors that empower people to prepare for disasters. Lucier (2001) stresses the importance of focusing education efforts on changing public culture and beliefs, and not simply trying to change behavior. He notes cultural changes tend to be permanent, whereas changes of behavior are typically temporary. He gives examples of successful safety culture changes including; (a) the widespread acceptance of seat belt use, (b) non-tolerance for driving under the influence, and (c) the proliferation of adults who embrace the Duck, Cover, and Hold earthquake procedure. He feels that the best way to begin changing disaster preparedness culture is through our schools.

Gagnon (1997) also believes in the need to change disaster preparedness culture, and takes it one step further by defining three main steps to instilling a culture of emergency preparedness; (a) build awareness, (b) set up an emergency management system, and (c) provide training and administrative activities. Regarding training activities, the World Trade Organization (1999) outlined four basic training objectives for any organization; (a) introduce and increase community awareness of hazards, (b) empower the community to participate in the planning process, (c) educate the community on steps to take for various disasters, and (d) enable emergency management personnel to carry out needed tasks. It states that people who have a basic understanding of a well-prepared emergency plan are more likely to take appropriate action.

Auf der Heide (1989) found that recent disasters are prime motivating factors for disaster preparedness in communities that experience them. But, without timely follow up and commitment to the planning process this motivation tends to decay quickly, much of the time before significant changes can be made.

Identifying the unique motivational needs of the adult learner is another important aspect to consider in disaster preparedness education. Cox (1990) writes that adults will learn when they feel a need to learn. This motivation is enhanced by prior experience in the topic, which helps show the value of the education being offered.

In summary, this literature review defined disasters as profound sociological events that become intertwined with existing social problems. These problems; apathy, denial, and disaster mythology, impose powerful societal and cultural roadblocks that impede efforts to educate and empower citizens, even those who suffered a significant disaster event. It is clear that for disaster education to be effective it must work towards changing the culture of the community or

organization by enlightening people through constant and consistent education of the most likely hazards and vulnerabilities they face.

## **PROCEDURE**

The procedures used in this evaluative research project included a comprehensive literature review, communications with key community leaders, and distribution, collection, and evaluation of an employee survey. The literature review included materials obtained at the National Fire Academy Learning Resource Center, Internet sources found on the World Wide Web, and the Western Washington University library. The Whatcom County Division of Emergency Management Deputy Director and a member of the City of Bellingham City Council provided information to define the level of policy support for the current disaster preparedness planning and education efforts, and further identify important motivational perspectives.

The most important component of this research project was the employee survey (appendix B). Draft survey questions were developed and distributed to several members of the May 2001 Executive Development class and Bellingham Fire Department administrative staff for review and comment. An additional question asking about the usefulness of this training compared to other city sponsored training was added to give the Human Resources Department additional information. During two separate meetings, the survey questions and an accompanying introduction email (appendix A) were presented to the city's computer network manager who created and distributed an online survey that was sent via intranet email to 640 employees who attended the city's disaster preparedness classes. The City of Bellingham uses the Lotus Notes computer software program as its' basic information management conduit. The survey distribution mechanism was constructed to allow employees to click on a small icon button at the bottom of the message, which opened the survey form.

Once the employee completed the survey, he/she simply clicked on a completed icon and the survey was automatically and anonymously inputted into a database for subsequent tabulation. Given the summer vacation season, employees were given between June 15, 2001 and July 15, 2001 to submit the survey.

### **Assumptions and Limitations**

An assumption is made that each of the respondents understood each question and answered truthfully. It is also assumed that each respondent actually attended the disaster preparedness training class. Furthermore, it is assumed that these city employees are also members of the public, and subject in large part to the same societal and cultural influences as those citizens not employed by the City of Bellingham.

Several limitations were experienced and are noted. A limitation in the literature review for this research project included apparent limited current research of the effectiveness of family disaster education. Another limitation was the survey was only delivered to employees with Intranet email addresses. Another limitation was the amount of returned surveys. According to the Executive Fire Officer Executive Development Research Guidelines, a minimum of 234 returned surveys were required for the survey instrument to be considered valid. Queenly (1995) notes that survey response of less than 50% can produce highly useful information but cannot be assumed to represent the total target population. Two hundred twenty nine surveys were returned, and while the number of returned surveys is just short of being considered valid, they provide significant insight and information into the effectiveness of the training. Yet another limitation was that the respondent had limited choices for each of the questions. On the one choice that indicated “other”, employees were asked to list what the specific action was. No



additional actions were submitted for that category. Lastly, some surveys were submitted without each question answered.

## **RESULTS**

Two hundred twenty nine city employees out of 640 who took the training returned the survey for a 35% response rate. All city departments were represented in the survey results, with Public Works employees sending back the highest number of completed surveys per department (48).

### **Research Question One**

Two hundred eight employees replied to the survey question asking if they had actions to prepare at work and/or home for disasters (see appendix C, table C1). One hundred fifty nine employees (76.4%) indicated they took preparedness steps, and 49 employees (23.6%) stated they did not. Out of the 159 employees, the most common preparedness action taken was discussing the presented preparedness information with family members (29%). The next most common action taken was reading the handouts and provided disaster preparedness manual (27%). The third most common action taken was setting up an out of town phone contact (14%).

It is also interesting to note that 131 employees took multiple preparedness actions (see appendix C, table C7). Forty seven employees completed at least two actions (35.8%). Analysis of all of the different combination of preparedness steps shows that 68 employees took the most common combination of steps - reading the class provided disaster preparedness book and discussing this information with family members (52%). The rest of the preparedness combinations are listed in Appendix C, table C7.

### **Research Question Two**

One hundred twenty two employees indicated that the information presented on how to personally prepare for disasters was either “most useful” or “very useful”. These responses equaled 55.7% of the total for the “most useful” and “very useful” rating for the preparation education category (appendix C, table C3). The next most useful class topic - action steps to take during an earthquake/hazardous materials incident, tallied 121 responses in either “very useful” or most useful” category. The lowest ranked category in terms of usefulness was the explanation of lessons learned from the Whatcom Creek Incident. Fifty seven (25.8%) employees indicated this topic was “pretty useful”.

At the request of the City of Bellingham Human Resources Department the survey also asked employees to compare the usefulness of this training to other city-sponsored training. The survey results show that 72.5% of the respondents felt the training was at least “useful and helpful”, and 23.5% of the respondents felt the class was “really useful and helpful”.

### **Research Question Three**

The last study component addressed by the survey related to assessing the need for future disaster preparedness training. To assist in determining this need, employees were asked if they would be interested in taking future disaster preparedness training courses. Two hundred nineteen employees responded to the question (appendix C, table C4). One hundred seventy two employees (78.5%) indicated they would be interested in this training, and 47 employees (21.5%) stated they would not be interested in participating in future training.

They were also asked which specialized disaster preparedness topics would interest them if made available. One hundred one employees (17.9%) indicated they would be interested in

department/division specific training. Ninety employees (16%) noted they were interested in a citywide mock earthquake response exercise (appendix C, table C4). The next two categories were evenly split with 69 responses (12%) each; first-aid/CPR and general disaster awareness topics. Neighborhood education was the next topic of interest with 68 responses (12.1%). The remaining topics garnered no more than 8.5% of the total responses. The topic with the least interest was business preparation/recovery/planning, with only 19 responses (3.4%).

## **DISCUSSION**

The results of the survey appear to reinforce the findings of the literature review. Even though the number of completed surveys fell short of the required number for validation, one can still postulate about the significance of the results, and use this information to chart a future course of action.

### **Research Question One**

The survey findings that related to research question one clearly showed that most city employees took some form of preparedness action step. As previously noted, discussing the preparedness information with family members was the most common action steps performed by the employees. There appears to be limited research into measuring the effectiveness of disaster education as noted by a dated study conducted by T.E. Drabek (1986). He notes his, and others, lack of research and understanding of the amount of time and effort family groups spend in disaster planning. He also indicates that some research shows it is rarely done. Larsson and Enander (1997) also noted that people tend not be interested in preparedness activities. However, the survey findings indicate that our education efforts may have had more of a positive impact on affecting action than the opinions noted in the reviewed literature.

The next most common step was actually reading the provided reading materials, and many employees indicated they performed both. The least performed action step was securing bookcases, computers, and other heavy objects in the event of earthquake.

Larsson and Enander's (1997) research also shows that people are reluctant to take disaster preparedness actions steps that require a lot of time and/or expense to accomplish, and the easier the required actions, the more likely they were to be accomplished. They observe that people who take steps for home emergencies are also unconsciously preparing for disasters. Examples of unconscious preparedness includes purchasing a first aid kit, taking first aid classes, and participating in emergency activities at work or school.

An Executive Fire Officer Applied Research Project completed by Jim Saletta (1999) notes the apparent lack of motivation for disaster planning/preparedness by non-emergency municipal employees. He suggests focusing on potential liability, public disaster education, and any recent disasters as motivators to spur employees into action. The City of Bellingham's disaster preparedness education efforts included all of these components, and it can be argued that the success of this effort can be at least partially attributed to this content. Another obvious factor that contributed to the success of the training is the commitment of money and personnel resources by the City to ensure that all City employees participated in the training by paying overtime, or covering essential positions with other personnel. Interestingly, disaster literature shows that disaster mitigation and education efforts are heavily influenced by the affluence of a community, and its' willingness to pay the costs associated with these efforts (Fischer,III, 1998).

### **Research Question Two**

Historically, disaster preparedness information campaigns have not resulted in significant public preparation activities (Larsson, Enander 1997). As mentioned earlier, one of the main

inhibiting factors for preparation efforts is uncertainty of what types of disasters to prepare for. Fortunately, or unfortunately depending on your perspective, the City of Bellingham is within a region with a high earthquake risk. The February 28, 2001 Nisqually Earthquake and the resulting media coverage heightened the vulnerability awareness of county residents, and city employees in particular. Neil Clement, Deputy Director of Whatcom County Emergency Management Division, feels strongly that personalizing disaster education is very important to affecting positive change in disaster preparedness, stating;

“The more personal, internal, and relevant the motivating element is, the greater the chance that a person or community will achieve preparedness. If a person takes one simple step towards preparedness, they are highly likely to take additional steps as well.” (personal communication, July 20, 2001).

Given the results of the survey, coupled with the literature reviewed, it can be argued that the earthquake and hazardous materials incident personal preparedness information was seen as the most useful component of the training because; (a) most of the employees experienced the earthquake either before or after the education sessions, coupled with their previous experience with the Whatcom Creek Incident, and (b) the personal preparedness component of the class included simple personal preparation steps and ideas that could be easily accomplished at home and the workplace.

### **Research Question Three**

The last question to be explored relates to the disaster preparedness training that still needs to be accomplished. This subject can be divided into two areas; (a) preparedness topics desired by employees, and (b) preparedness topics related to City organizational needs.

The survey results from the question asking about disaster topics that interest employees were fairly evenly distributed. The top two choices were directly related to the employees' job and potential role in a disaster. This is not surprising given the previous lack of a cohesive city disaster plan, and the subsequent confusion and lack of direction during the Whatcom Creek Incident and the motivating experience of the Nisqually earthquake. This interest indicates they want to take positive steps towards understanding their role as a city employee during a crisis.

The City's organizational needs for disaster preparedness training and topics is similar to the interests of the employees. Tierney and Goltz (1997) reviewed Japan's response to the Kobe Earthquake, and identified lessons that can be applied to organizations within the United States. One of the key lessons identified was that given the spontaneous and effective role volunteers play in initial disaster response, local government response agencies should expand efforts to involve volunteers in the provision of emergency care and disaster relief. Leslie Langdon, a City Council member and strong supporter of the city's disaster planning efforts is a C.E.R.T. course graduate. She notes that there needs to be a stronger effort to promote and provide C.E.R.T. training for all city neighborhoods, including city employees (personal communication, August 6, 2001).

Erickson (1999) emphasizes that municipalities should focus in house training programs to include; (a) evacuation of nonessential personnel, (b) proper use of equipment and procedures by first responders, and (c) in house training exercises with local mutual aid agencies/business. He also notes that the quality and success of any municipalities' emergency response plan is only as good as the training given to the employees who must implement the plan (1999). These points are similar to the top two general areas of desired training identified by the employees; (a) department/division specific training, and (b) a mock earthquake training exercise.

The implications of these findings for the City of Bellingham are that the initial disaster preparedness training has had the desired affect of empowering most employees to take action steps to personally prepare, and participate in future disaster preparedness and response training. Furthermore, the employees desire additional disaster training tailored to their individual work situation. Another implication is that the currently offered C.E.R.T. training program may contain preparedness objectives that would enhance department/division preparedness training goals.

## **RECOMMENDATIONS**

The City's initial disaster preparedness education efforts appear to have been successful. However, the City cannot rest on laurels and assume that it is now ready to respond effectively to a community crisis. Disaster planning is a never-ending process. New employees should receive the initial disaster preparedness education, and the City should continue disaster preparedness training, focusing on individual department/division training. Department specific training should include components that address emergency actions such as fire extinguisher use, evacuation, and first aid. It should also include training on the department/division's specific role in responding to a disaster situation to support the City's disaster response efforts. The C.E.R.T. training curriculum should be evaluated to determine if this program would be a good fit within the City's disaster preparedness education program.

Development and delivery of a large-scale mock disaster exercise should also be explored. However, this exercise should only be conducted after the city departments have had a chance to complete their internal training. Exercise planners need to use caution in developing a large scale exercise without having first ensured that all key players and organizations are thoroughly familiar with their disaster plan and their role within this plan.

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## **APPENDIX A**

May 23, 2001

Since the Whatcom Creek Incident, the city made a commitment to improve emergency response and disaster management procedures and capabilities. Your participation in the recent employee disaster preparedness presentation a couple of months ago was a key component of this process.

I am enrolled in the National Fire Academy Executive Fire Officer Program, and a key component of this program is completion of an Applied Research Project designed to improve an organization's operations. I have chosen our efforts to improve City of Bellingham disaster preparedness as my research project. As part of this effort, I am gathering information from all employees who attended these disaster preparedness presentations to help assess if this training is helpful in improving disaster preparedness. This information will be used to improve our disaster education efforts and target specific areas you would like to see addressed.

I would greatly appreciate your help in answering the questions to the best of your ability and returning the completed survey by July 15<sup>th</sup>. Your response will be submitted anonymously. Please contact me via phone or email if you would like a copy of my completed project. I will distribute the survey results to everyone once it is completed.

Thanks!

Bill Boyd, Assistant Chief  
BELLINGHAM FIRE DEPARTMENT

## APPENDIX B

### DISASTER PREPAREDNESS EDUCATION SURVEY

Please take the time to answer the following questions.

1. What department/division do you work for? \_\_\_\_\_
2. Compared to other citywide training you have attended, how would you rate this class on a 1 to 10 scale? (with 1 being not worthwhile at all to 10 being extremely useful and helpful)
3. What aspect of the recent disaster preparedness class did you find most useful?

Rank in priority order of interest-1 being least useful-7 being the most useful.

- ☐ Explanation of Whatcom County/Bellingham vulnerabilities.
- ☐ Characteristics of earthquakes and hazardous materials incidents.
- ☐ Actions to take during an earthquake/hazardous materials incidents.
- ☐ Personal disaster preparedness education (obtaining 72 hour kits, CERT training, home preparations, etc...).
- ☐ Explanation of lessons learned from Whatcom Creek Incident.
- ☐ Explanation of city disaster planning efforts.

4. If more specialized disaster preparedness classes were offered, would you be interested in participating? \_\_\_\_Yes                      \_\_\_\_No

If yes, which of these topics would interest you? (circle all that apply)

- ☐ Incident Command
- ☐ CERT
- ☐ Emergency Operations Center exercises
- ☐ First Aid/CPR
- ☐ General disaster awareness/preparedness topics
- ☐ Dept./Division level specific training
- ☐ City-wide practice exercise event (mock earthquake response)
- ☐ School/PTA training sessions
- ☐ Business preparation/recovery/planning
- ☐ Neighborhood education

5. Did you do anything to personally prepare yourself at work and/or home for disasters as a result of this class? \_\_\_\_\_ Yes \_\_\_\_\_ No

If yes, what actions did you take? (Check all that apply)

- |                          |  |
|--------------------------|--|
| <input type="checkbox"/> | Secure your home water heater to a wall                            |
| <input type="checkbox"/> | Build/purchase a cache of 72 hour supplies/kit                     |
| <input type="checkbox"/> | Secure bookcases/furniture/computers to prevent earthquake damage. |
| <input type="checkbox"/> | Discuss information with family members                            |
| <input type="checkbox"/> | Set up an out of town phone contact                                |
| <input type="checkbox"/> | Read the disaster preparedness book                                |
| <input type="checkbox"/> | Provided in class  |
| <input type="checkbox"/> | Attend Community Emergency Response                                |
| <input type="checkbox"/> | Team (CERT) training   |
| <input type="checkbox"/> | Other: Please list _____   |

***Thank you for your help!***

## APPENDIX C

**Table C1**

Results of survey question 1

*What department/division do you work for?*

<b>Department</b>	<b>Number of employees</b>	
Mayor/Executive	4	
Community Development	5	
Legal	6	
Museum	6	
Planning	7	
Judicial Services	8	
Engineering	10	
Library	10	
Finance	13	
Human Resources	13	
Information Technology	14	
Parks	15	
Fire	24	
Police	44	
Public Works	48	
Total	227	(2 people did not identify their department)

**Table C2****Results of survey question 2**

*Compared to other citywide training you have attended, how would you rate this class on a 1 to 10 scale?*

<b><u>Rating #</u></b>	<b><u>Number of responses</u></b>	<b><u>Level of usefulness</u></b>	<b><u>Percentage</u></b>
8	52	Really useful/helpful	23.5
5	43	Useful/helpful	19.5
7	43	More useful/helpful	19.5
10	22	Extremely useful/helpful	10.0
6	21	Reasonably useful/helpful	9.5
9	21	Very useful/helpful	9.5
3	8	Slightly worthwhile	3.6
4	8	Worthwhile	3.6
1	2	Not worthwhile at all	.9
2	1	Not worthwhile	.5
<hr/>			
Total Count 221			

**Table C3**Results to survey question 3

*What aspect of the recent disaster preparedness class did you find most useful? (Rank in priority order of interest)*

<b>Class topic</b>		<b>Number of responses</b>	<b>Percentage</b>
Personal disaster education	<b>Most useful</b>	<b>63</b>	<b>28.8</b>
	Very useful	59	26.9
	Pretty useful	47	21.5
	Useful	26	11.9
	Somewhat useful	12	5.5
	Moderately useful	12	5.5
<b>Class topic</b>		<b>Number of responses</b>	<b>Percentage</b>
Actions to take during an earthquake	<b>Very useful</b>	<b>70</b>	<b>31.4</b>
	Most useful	51	22.9
	Pretty useful	44	19.7
	Useful	34	15.2
	Moderately useful	10	4.5
	Somewhat useful	10	4.5
	Least useful	4	1.8
<hr/>			
Earthquake/HazMat characteristics	<b>Pretty useful</b>	<b>67</b>	<b>30.5</b>
	Useful	47	21.4

(table continues)

<b>Class topic</b>	<b>Number of responses</b>		<b>Percentage</b>
Earthquake/HazMat characteristics	<b>Very useful</b>	47	21.4
	Most useful	28	12.7
	Moderately useful	18	8.2
	Somewhat useful	8	3.6
	Least useful	5	2.3
<hr/>			
Explanation of lessons learned	<b>Pretty useful</b>	57	25.8
	Very useful	55	24.9
	Most useful	38	17.2
	Useful	38	17.2
	Moderately useful	17	7.7
	Somewhat useful	11	5.0
	Least useful	5	2.3
<hr/>			



**Table C4**Results to survey question 4

*If more specialized disaster preparedness classes were offered, would you be interested in participating?*

<b><u>Answer</u></b>	<b><u>Number of responses</u></b>	<b><u>Percentage</u></b>
Yes	172	78.5
No	47	21.5

Results to survey question 4 follow up question

*If yes, what topics would you be interested in?*

<b><u>Topic</u></b>	<b><u>Percentage</u></b>
Department/Division level specific training	17.9
Mock earthquake exercise event	16.0
General disaster awareness/preparedness topics	12.3
Neighborhood education	12.1
Emergency Operations Center exercises	8.5
Incident Command System training	7.8
Community Emergency Response Team Training	6.0
School/PTA training sessions	3.7
Business planning/preparation/recovery	3.4

**Table C5**Results from survey question 5

*Did you do anything to personally prepare yourself at work and/or home for disasters as a result of this class?*

<b><u>Answer</u></b>	<b><u>Number of employees</u></b>	<b><u>Percentage</u></b>
Yes	159	76.4%
No	49	23.6%

**Table C6**Results from survey question 5 follow up question

*What actions did you personally prepare yourself at work at/or home for disasters as a result of this case?*

<b><u>Actions taken</u></b>	<b><u>Percentage</u></b>
Discuss information with family members	29.0
Read the disaster preparedness book	27.0
Set up an out of town phone contact	14.0
Build/purchase a cache of 72 hour kit	13.0
Secure home water heater to the wall	10.0
Secure bookcases/furniture/computers	6.0
Other	4.0

**Table C7**Summary of multiple actions taken

<b>Number of actions taken</b>	<b>Number of people who took action</b>	<b>Percentage</b>
2	47	35.8
3	46	35.1
4	24	18.3
5	9	6.8
6	3	2.3
7	2	1.5
Total	131	

**Table C7**Combinations of disaster preparedness actions taken

<u><b>Actions</b></u>	<u><b>Employees</b></u>
Discuss information with family members & Read the class provided disaster preparedness book	68
Discuss information with family members & Set up an out of town phone contact	50
Build/purchase a cache of 72 hour supplies/kit & Discuss information with family members	42
Discuss information with family members & Set up an Out of town phone contact & Read the class provided Disaster preparedness book	41
<b>Total</b>	<b>131</b>